The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A method for classifying plant embryo quality comprising:

(a) developing a classification model by

(i) acquiring raw digital image data of reference samples of whole plant embryos or of embryo organs from plant embryos of known embryo quality;

(ii) performing a data analysis by applying one or more classification algorithms to the acquired raw digital image data, wherein at least one of the classification algorithms uses more than an embryo perimeter from the acquired raw digital image data, the data analysis resulting in development of a classification model for classifying plant embryos by embryo quality;

(b) acquiring raw digital image data of a plant embryo or a plant embryo organ from a plant embryo of unknown embryo quality; and

(c) applying the developed classification model to the raw digital image data of step (b) in order to classify the quality of the plant embryo of unknown embryo quality.

2. A method according to Claim 1, wherein the raw digital image data acquired in step (a)(i) is preprocessed using one or more preprocessing algorithms before step (a)(ii); the raw digital image data acquired in step (b) is preprocessed using one or more preprocessing algorithms; and step (c) is carried out using the preprocessed raw digital image data.

3. A method according to Claim 2, wherein the preprocessing algorithm removes raw image data that is not from the plant embryo or plant embryo organ.

4. A method according to Claim 2, wherein the preprocessing algorithm reduces the amount of raw image data yet retains substantially all of the embryo or embryo organ geometric information.

5. A method according to Claim 2, wherein the preprocessing algorithm calculates metrics.

6. A method according to Claim 1 wherein the raw digital image data is acquired from more than one view of the plant embryo or plant embryo organ.

7. A method according to Claim 1 wherein the plant embryo quality is morphology.

8. A method according to Claim 1 wherein the plant embryo quality is embryo conversion potential.

9. A method according to Claim 1 wherein the plant embryo is a plant somatic embryo.

10. A method according to Claim 1 wherein the plant is a tree.

11. A method according to Claim 10 wherein the tree is a member of the order *Coniferales*.

12. A method according to Claim 10 wherein the tree is a member of the family *Pinaceae*.

13. A method according to Claim 10 wherein the tree is selected from the group consisting of genera *Pseudotsuga* and *Pinus*.

14. A method for classifying plant embryo quality comprising:

(a) developing a single metric classification model by

(i) acquiring raw digital image data of reference samples of whole plant embryos or any portion thereof from plant embryos of known embryo quality;

(ii) calculating a metric value from the acquired raw digital image data of each embryo of known embryo quality;

(iii) dividing the metric values obtained in step (a)(ii) into two sets of metric values according to their known embryo quality;

(iv) calculating a Lorenz curve from the two sets of metric values;

(v) using any point on the Lorenz curve calculated in step (a)(iv) as a threshold value to arrive at a single metric classification model for classifying plant embryos by embryo quality;

(b) acquiring raw digital image data of a whole plant embryo or any portion thereof from a plant embryo of unknown embryo quality; and

(c) applying the developed single metric classification model to the raw digital image data of step (b) in order to classify the quality of the plant embryo of unknown embryo quality.

15. A method according to Claim 14 wherein two or more single metric classification models derived from different metrics are combined using one or more classification algorithms to develop a classification model for classifying plant embryos by embryo quality.

16. A method according to Claim 14, wherein the raw digital image data acquired in step (a)(i) is preprocessed using one or more preprocessing algorithms before step (a)(ii); the raw digital image data acquired in step (b) is preprocessed using one or more preprocessing algorithms; and step (c) is carried out using the preprocessed raw digital image data.

17. A method according to Claim 16, wherein the preprocessing algorithm removes raw image data that is not from the plant embryo or plant embryo organ.

18. A method according to Claim 16, wherein the preprocessing algorithm reduces the amount of raw image data.

19. A method according to Claim 14 wherein the raw digital image data is acquired from more than one view of the plant embryo or plant embryo organ.

20. A method according to Claim 14 wherein the plant embryo quality is morphology.

21. A method according to Claim 14 wherein the plant embryo quality is embryo conversion potential.

22. A method according to Claim 14 wherein the plant embryo is a plant somatic embryo.

23. A method according to Claim 23 wherein the plant is a tree.

24. A method according to Claim 24 wherein the tree is a member of the order *Coniferales*.

25. A method according to Claim 24 wherein the tree is a member of the family *Pinaceae*.

26. A method according to Claim 24 wherein the tree is selected from the group consisting of genera *Pseudotsuga* and *Pinus*.

27. A method for classifying plant embryo quality comprising:

(a) developing a classification model by

(i) acquiring absorption, transmittance or reflectance spectral raw data of reference samples of plant embryos or any portion thereof from plant embryos of known embryo quality;

(ii) performing a data analysis by applying one or more classification algorithms to the spectral raw data, the data analysis resulting in development of a classification model for classifying plant embryos by embryo quality;

(b) acquiring absorption, transmittance or reflectance spectral raw data of a plant embryo or any portion thereof from a plant embryo of unknown embryo quality; and

(c) applying the developed classification model to the spectral raw data of step (b) in order to classify the quality of the plant embryo of unknown embryo quality.

28. A method according to Claim 15, wherein the absorption, transmittance or reflectance spectral raw data acquired in step (a)(i) is preprocessed using one or more preprocessing algorithms before step (a)(ii); the absorption, transmittance or reflectance spectral raw data acquired in step (b) is preprocessed using one or more preprocessing algorithms; and step (c) is carried out using the preprocessed absorption, transmittance or reflectance spectral raw data.

29. A method according to Claim 16, wherein the preprocessing algorithm reduces noise and adjusts for drift and diffuse light scatter.

30. A method according to Claim 16, wherein the preprocessing algorithm reduces the amount of absorption, transmittance or reflectance spectral raw data yet retains substantially all of the spectral information.

31. A method according to Claim 16, wherein the preprocessing algorithm calculates metrics.

32. A method according to Claim 15 wherein the absorption, transmittance or reflectance spectral raw data is acquired from more than one view of the plant embryo or portion thereof.

33. A method according to Claim 15 wherein the absorption, transmittance or reflectance spectral raw data is acquired from one or more embryo regions selected from the group consisting of cotyledon, hypocotyl and radicle.

34. A method according to Claim 15 wherein the plant embryo quality is morphology.

35. A method according to Claim 15 wherein the plant embryo quality is embryo conversion potential.

36. A method according to Claim 15 wherein the plant embryo is a plant somatic embryo.

37. A method according to Claim 15 wherein the plant is a tree.

38. A method according to Claim 25 wherein the tree is a member of the order *Coniferales*.

39. A method according to Claim 25 wherein the tree is a member of the family *Pinaceae*.

40. A method according to Claim 25 wherein the tree is selected from the group consisting of genera *Pseudotsuga* and *Pinus*.